Appendix F:
TestItemFile

Part 1. Teacher Notes

Part 2. Answer Key

Part 3. Test Items

Part 1: Teacher Notes

Introduction to the file

The TestItem file provides the means for assessing the knowledge, comprehension, and problem solving capability of students in regard to the objectives covered in the Detective Agency. The intent is to provide teachers with a *quick* and *efficient* means of gathering objective information that can be used in *summative* fashion to compute marks or grades. These four highlighted words characterize the TestItemFile.

The quantitative information provided through the TestItem file should be considered as just one component of a comprehensive assessment program that includes:

Specialized Places for Student Writing

- AskMe Logbook
- Student Problem Book
- Student Dictionary

Student Participation in Their Own Assessment

- Conferencing
- Portfolios

Charts to Monitor Progress

- **Events-Based Recordkeeping Charts** (provided as CopyMasters).
- **Objectives-Based Recordkeeping Charts** (provided as CopyMaster in two places)

Files

- **PSFile** (Problem Solving File)
- **TestItemFile**

Diagnostic Assessment

- DMP references

Special Activities

- Preparation of a resumé.

Of particular relevance to the **TestItemfile** are the **Objectives-Based Recordkeeping Charts** which are provided in each Section summary. These charts provide a systematic way of monitoring student performance with respect to each objective, and therefore can be effectively used in conjunction with the **TestItemfile.**

Structure of the File

The File is a bank of 17 test items. By selecting items from the file, teachers can put together tests to assess the objectives covered in the Detective Agency.

To facilitate the process of selecting items, each item is categorized under:

- **Content Strand** (geometry or measurement)

- **Objective** (Alberta Ed)
- **Type of Objective** — New, Extension, Maintenance
- **Cognitive Level** — knowledge, understanding, problem solving

Special Focus of the file

New Objectives

Objectives that cover new content for Grade 5 are given priority over objectives which only extend a concept or skill or which review previously taught material. There are more test items for New objectives as compared to Extension objectives or Maintenance objectives.

Pictorial and Symbolic modes

MathWorlds involves extensive use of concrete materials and aids. But:

1. because DMP provides an excellent program of assessment using concrete materials, and
2. because the use of concrete manipulatives is best assessed:
   - in the context of their use,
   - in a one-on-one situation, and
3. because the intent of the TestItemfile is to provide an assessment instrument that:
   - is easy to administer to a class as well as individuals,
   - produces a quick and objective mark,

the focus of the TestItemfile is on the pictorial and symbolic modes and in particular on the relations between them.

Contents of the File

The TestItemfile contains:

- Part 1: Teacher Notes
- Part 2: Answer Key
- Part 3: Test Items

Part 2: Answer Key

Appendix G: References and More Resources

About detectives and detective work

Baker, E. (1980). *The junior detective series: At the scene of the crime.* Elgin, IL: The Child's World. (juvenile).

Baker, E. (1980). *The junior detective series: In the detective's lab.* Elgin, IL: The Child's World. (juvenile).

Baker, E. (1980). *The junior detective series: Master of disguise.* Elgin, IL: The Child's World. (juvenile).

Baker, E. (1980). *The junior detective series: Shadowing the Suspect.* Elgin, IL: The Child's World. (juvenile).

Baker, E. (1980). *The junior detective series: Spotting the fakes - forgeries and counterfeits.* Elgin, IL: The Child's World. (juvenile).

Breckon, W. (1975). *Science versus crime.* Sussex, ENG: Wayland. (juvenile)

Buckwalter, A. (1984). *Investigative methods.* Toronto, ONT: Butterworth.

Ericson, R. (1981). *Making Crime: A study of detective work.* Toronto, ONT: Butterworth.

Golec, A.M. (1976). *Techniques of Legal Investigation.* Springfield, IL: Charles Thomas.

Liebers, A. & Vollmer, C. (1954). *The Investigator's Handbook.* New York: Arco.

Millimaki, R. (1976). *The making of a detective.* Philadelphia: Lippincott. (Juvenile).

Masini, S. & Rotasso, G. (1988). *Complete Book of Firearms.* New York: Portland House.

Plenty of pictures and provides a historical presentation. And for an American book it provides lots of metric information. Also has a nice succinct glossary if you care to sharpen firearms vocabulary.

Newton, M. (1990). *Armed and Dangerous: A writer's guide to weapons.* Cincinnati: Writer's Digest Books.

If you don't want to get caught saying silly things about guns such as "He picked the 45 Magnum up by its barrel" (there is no such weapon - a 44 Magnum perhaps as used by "Dirty Harry" but no 45 Magnum) then this book should be perused.

Zonderman, J. (1990). *Beyond the crime lab: The new science of investigation.* Toronto, ONT: Wiley.

Teaching references and suggestions

Barnett, C.S. (1991). Sneaker data sheet. *Arithmetic Teacher 38* (5) 26-33.

Can use "footprints" as well as fingerprints to make identifications.

Bidwell, J. (1987). Using Reflections to find symmetric and asymmetric patterns. *Arithmetic Teacher 34* (7) 10-15.

Explores symmetry through the use of a mirror.

Bright, G., & Harvey, J. (1988). Learning and fun with geometry games. *Arithmetic Teacher 35 (8) 22-26.*

Contains games that provide excellent experience with prisms and pyramids.

Dunkels, A. (1990). *Making and exploring Tangrams. Arithmetic Teacher 37* (6) 38-42.
Provides a guided approach to making tangrams from paper folding and cutting.

Finger Prints (1991) in the IDEAS section of the *Arithmetic Teacher 38* (7) 24-33.
Presents ways of classifying and identifying finger prints, some of it in a detective motif.

Giganti, P. & Cittadino, M. (1990). The art of tessellation. *Arithmetic Teacher 37* (7) 6-16.
The best introduction to tessellations through Escher-like patterns that I've seen in some time. Full of activities and wise counsel as well as extensive references and includes a glossary too.

Heukerott, P. (1988). Origami: Paper folding - the algorithmic way. *Arithmetic Teacher 35* (5) 4-8.
If some of the detectives become enthused about solving the origami problem, this article might lead them into other activities and references.

Irons, C. & Irons, R. (1991). Cut to create. *Arithmetic Teacher 39* (3) 25-33.
Five excellent activities that are ready made as follow through cases on the Tangram lesson.

Jenkins, L. & McLean, P. (1971). *It's a tangram world*. San Leandro, CA: Educational Science Publishers.
Interesting activities integrated with music, games, story problems and geography.

Jensen, R. (1984). Multilevel metric games. *Arithmetic Teacher, 32* (2) 36-39.
A variety of games to provide practice with metric units of length.

Kawaii, T. (1984). *Colorful Origami*. New York: Barnes & Noble.
Origami done by someone with a Japanese mind.

Kriegler, S. (1991). The tangram is more than an ancient puzzle. *Arithmetic Teacher 39* (9) 38-43.
A host of activities in amenable to Case format relating tangrams to graphing. Provides multiple solutions to problems as well.

Peck, D., Jencks, S. & Connell, M. (1989). Improving instruction through brief interviews. *Arithmetic Teacher 37* (3) 15-17.
If you're not convinced that interviews or conferencing is worthwhile in mathematics you might give this article a read.

Prentice, G. (1989). Flexible straws. *Arithmetic Teacher, 37* (3) 4-5.
A set of tips and techniques for using straws and pipe-cleaners to show geometric properties of figures.)

Rahim, M. & Sawada, D. (1986). Revitalizing school geometry through Dissection-Motion Operations. *School Science and Mathematics*, 86, 235-246.

Rahim, M. & Sawada, D. (1989). Inventing Tangrams through Dissection-Motion-geometry. *School Science and Mathematics*, 89, 113-129.

Read, R. C. (1965). *Tangrams – 330 Puzzles*. New York: Dover.

Shubnikov, A. (1974). Symmetry in science and art. London: Plenum Press.

A fine reference for integrating symmetry with art and science.

Sicklick, F., Turkel, S. & Curcio, F. (1988). The "transformation" game. *Arithmetic Teacher 36* (2) 37-41.

Describes a game that provides fun experience with slides, flips and turns. Perhaps the detectives could make the game as a project.

Syroi, R.J. (1990). Communicating about spatial relationships. *Arithmetic Teacher 37* (6) 21-23.

Relates prisms and pyramids to Logo.

Taylor, L., Stevens, E., Peregoy, V. Bath, B. (1991). American Indians, mathematical attitudes and the Standards. *Arithmetic Teacher 38* (6) 14-21.

Native arts and crafts are in part presented through Escher-like patterns.

Woodward, E. & Buckner, P. (1987). Reflections and Symmetry - A second-grade mini unit. *Arithmetic Teacher, 35* (2) 8-11.

Although aimed at the second grade, this article provides an excellent introduction to the use of the Mira that would be appropriate and fun for grade 4 students using Mira for the first time.

Zaslavsky, Claudia. (1990). Symmetry in American folk art. *Arithmetic Teacher 38* (1) 6-12.

Many examples illustrate Escher-like patterns.

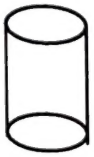
Appendix H: Illustrated Math Dictionary

S

cone

A pyramid with a circular base

cylinder



A prism with circular bases

hexagon

A six sided polygon

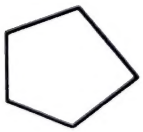
hexahedron

A regular polyhedron having six faces. Sometimes called a cube.

net

A set of contiguous two dimensional shapes which when cut out and folded up become the faces of a three dimensional object. The diagram shows a net for a cube (hexahedron). *to come*

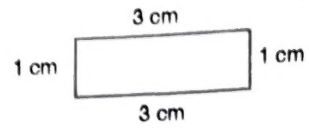
pentagon



A five sided polygon

perimeter

The length of the boundary of a two dimensional figure. The diagram shows a rectangle having a perimeter of 8 cm.

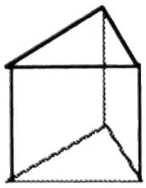


polygon

A closed two dimensional figure consisting of line segments. "Gon" means "angle" so in a sense polygon means many angles.

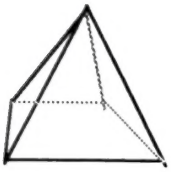
prism

A three dimensional object consisting of two identical polygonal bases and sides which are rectangular. Thus a triangular prism has two bases that are triangles joined together by three rectangular sides.

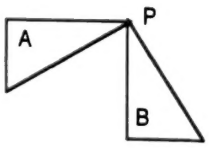


pyramid

A three dimensional object consisting of one polygonal base and sides which are triangles. A square based pyramid has a square for a base and four triangles meeting at a common point opposite to the base.



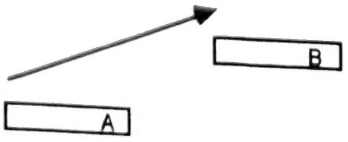
An operation of Euclidean geometry in which a figure is transformed by flipping it about a line. In the diagram, rectangle A is a reflection of rectangle B and vice versa. Line l is called the line of reflection.



An operation of Euclidean geometry in which a figure in transformed by turning it about some point. In the diagram triangle A is rotated into triangle B with respect to point P.

translation

An operation of Euclidean geometry by which a figure is transformed into another by sliding it without turning. In the diagram rectangle A is translated into rectangle B. The arrow indicates the direction and the amount of slide.



line of symmetry

a line passing through a two dimensional figure dividing it into two parts which are reflections of each other. The diagram shows a trapezoid having one line of symmetry.